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REMAINING TOOL LIFE PREDICTION BASED ON FORCE SENSORS SIGNAL DURING END MILLING OF STAVAX ESR STEEL

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ABSTRACT

This paper focuses on the prediction of the Remaining Useful Life (RUL) of a carbide insert end mill. As tool life degradation due to wear is the main limitation to machining productivity and part quality, prediction and periodic assessment of the condition of the tool is very helpful for the machining industry. The RUL prediction of tools is demonstrated based on the force sensor signal values using the Support Vector Regression (SVR) method and Neural Network (NN) techniques. End milling tests were performed on a stainless steel workpiece at constant machining parameters and the cutting force signal data was collected using force dynamometer for feature extraction and further analysis. Both the SVR and NN models were compared based on the same set of experimental data for the prediction performance. Results have shown a good agreement between the predicted and actual RUL of the tools for both models. The difference in the level of the prognostic matrices such as accuracy, precision and prediction horizon for both models was discussed.

Keywords: Machining, Neural network, Prognostics, Remaining useful life, Support vector regression, Wear

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